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position, the direction in which it was facing, and the length of the pendulum.

8.—If a shock was not felt in your neighborhood, although noticed at places not very far distant, do not fail to answer the first four questions, as negative reports are of great interest in defining the limits of the disturbed area, etc. State also the nearest point to your station where the shock was felt.

9.—Name the writer.

A. O. LEUSCHNER.

Berkeley, Cal., June 9th.

Secretary California State Earthquake Investigation Committee.

HEIGHT OF THE HYDROGEN FLOCCULI.

The first photographs of the Sun in hydrogen light were taken with the Rumford spectroheliograph of the Yerkes Observatory in 1903. The Hβ line was used. Upon developing the plate, Mr. ELLERMAN and I were surprised to find that instead of bright flocculi, similar to those obtained with the H and K lines of calcium, *dark* flocculi, of similar form, were present. Subsequent photographs showed that the hydrogen flocculi are ordinarily dark, though in the case of active eruptions, and sometimes in the immediate vicinity of Sun-spots, these flocculi are bright. With the Rumford spectroheliograph, it was possible to photograph only narrow zones of the solar image in hydrogen light, but with the spectroheliograph now in use with the Snow telescope on Mount Wilson, the entire solar disk is photographed daily with one of the hydrogen lines.

The darkness of the hydrogen flocculi was accounted for provisionally on the assumption that the regions shown are at a considerable elevation in the chromosphere, where the temperature is low enough to produce absorption. Independent evidence in favor of this idea has recently been afforded by the demonstration that the comparatively rare *dark* calcium flocculi are characterized by the widening of the H_3 and K_3 lines (due to the high level calcium vapor) and that these occasional dark calcium flocculi are almost invariably associated with very strong dark hydrogen flocculi. Some uncertainty as to the elevation of the ordinary dark hydrogen flocculi would still remain, however, since the exceptionally dark hydrogen flocculi just referred to might perhaps be at a greater elevation. A new method of testing the question recently suggested itself to me and has been carried out with the aid of a Zeiss stereocomparator. In this instrument it is possible to observe, through a single eye-piece, (belonging to the new monocular micrometer attachment) a hydrogen plate superposed upon a calcium plate of the same date. The plates compared, are taken within so short an interval of time that no appreciable change occurs on the Sun between the exposures. The monocular eye-piece is provided with a device by means of which the light from either plate can be cut off, while the light from the other plate is admitted to the eye. The corresponding hydrogen and calcium flocculi can thus be observed in rapid succession, and the slightest relative displacement of their images can be detected and measured with the aid of the micrometer. Working in this way, especially near the Sun's limb, I found marked displacements of the hydrogen flocculi toward the limb. At the middle of the disk such displacements are almost entirely absent, though the observations are complicated by the fact that the hydrogen and calcium flocculi are not always identical in form. The results of a large number of measures of the relative positions of calcium and hydrogen flocculi leave no doubt in my mind, however, that the hydrogen flocculi, on the average, lie at a higher level, that the H_2 calcium flocculi. Such a difference of level would naturally cause displacements of the hydrogen flocculi with reference to the calcium flocculi, which should be in the direction of the limb and should increase with the distance from the center of the Sun. Such displacements are actually shown in the measures.

The method promises to be of considerable service, both in the comparative study of hydrogen and calcium flocculi, and in the investigation of differences of level of the calcium flocculi photographed with the H_1, H_2 and H_3 lines.

George E. Hale.

IDENTIFICATION OF FAINT LINES IN THE SPECTRA OF SUN-SPOTS.

In a recent paper by Mr. Adams and myself (*Contributions from the Solar Observatory,* No. 5), it was shown that the faint lines in the spectra of Sun-spots are coincident in position with the faint lines of the solar spectrum, though the solar lines are much fainter than the corresponding spot lines. Since most of these faint lines are not identified in Rowland's table of solar spectrum wave-lengths, the question of their identification was naturally raised. Mr. Adams and